VZCZCXRO7061
RR RUEHHM RUEHLN RUEHMA RUEHPB RUEHPOD
DE RUEHFR #0033/01 0081631
ZNR UUUUU ZZH
R 081631Z JAN 08
FM AMEMBASSY PARIS
TO RUEHC/SECSTATE WASHDC 1627
INFO RHEHAAA/WHITE HOUSE WASHDC
RUEAEPA/EPA WASHDC
RUEHC/DEPARTMENT OF INTERIOR WASHDC
RHMFIUU/DEPT OF ENERGY WASHINGTON DC
RUEHMRE/AMCONSUL MARSEILLE 1939
RUEHSR/AMCONSUL STRASBOURG 0519
RUEHZN/ENVIRONMENT SCIENCE AND TECHNOLOGY COLLECTIVE

UNCLAS SECTION 01 OF 03 PARIS 000033

SIPDIS

SIPDIS

WHITE HOUSE FOR CEQ, STATE FOR OES/INTERIOR PLEASE PASS TO USGS, DOE FOR OFFICE OF SCIENCE

E.O. 12958: N/A
TAGS: SENV ENRG TRGY FR
SUBJECT: FRENCH PETROLEUM INSTITUTE - RESEARCHING SUSTAINABLE ENERGY AND SEEKING NEW COLLABORATORS

PARIS 00000033 001.2 OF 003

¶1. SUMMARY. ESTH officers visited the French Petroleum Institute (Institut Francais du Petrole or 'IFP'), a public research center focused on industrial R&D research in energy and transportation. The visit's purposes were to assess IFP's strategic priorities, obtain an understanding of its research strengths, and determine opportunities for new collaborative partnerships. Technical discussions centered on IFP's preparations for energy transformation, and its role researching new energy systems, such as biofuels and hydrogen, and CO2 capture and storage. IFP's biofuels and carbon sequestration research which we summarize below is impressive. U.S. agencies interested in collaboration in these fields might wish to consider IFP a potential research partner. IFP also seeks to increase doctoral and post-doctoral researchers to its research centers. End summary.

The IFP Strategy

¶2. IFP's activities cover oil, gas, and substitutes including: exploration, production, refining, petrochemicals, engines and petroleum products use. IFP seeks to expand the boundaries for oil and gas exploration and production and is inventing new technologies to exploit untapped reserves. To strengthen know-how in clean refining processes and petrochemicals, IFP is developing technologies to enhance production of environmentally-friendly fuels. IFP is also transforming biomass, gas, and coal into fuels for tomorrow. It is also engaged in hydrogen research. As the bulk of the CO2 emissions result from energy use, efforts to reduce them must be combined with efforts to capture CO2 wherever possible. IFP is France's leading researcher in CO2 capture, transport and underground storage with more than 12,500 active patents, 301.5 million Euro budget including 241 million Euros for R&D and some 1735 employees.

New energy systems for tomorrow, and beyond

¶3. IFP leverages twenty years of expertise in both biofuels production processes and the production of synfuels from natural gas, coal, and biomass. Research includes enhancing fuels derived from vegetable feedstock to improve existing processes for ethanol fuel, ethyl tertiary butyl ether (ETBE), methyl esters of vegetable oil (VOME) and new processes to synthesize fuels from cellulosic biomass to include wood, grain, forest residues, and organic wastes.

¶4. Ethanol derived fuels. IFP is researching and developing a production process for acetone butanol and ethanol from lignocellulosic biomass such as cereal straw, corn stalks, wood residues and even organic waste, such as water treatment plant sludge. IFP seeks to overcome remaining technological barriers to enhance enzymatic hydrolysis of lignocellulosic matter and, secondly, the ethanolic fermentation of pentoses produced by the hemicellulose fraction. This research, drawing mainly on IFP's expertise in molecular biology, microbiology and microbial genetics, is being conducted in collaboration with INRA (Institut national de recherche agronomique/National Agronomic Research Institute) and the CNRS (Centre National de la Recherche Scientifique/National Center for Scientific Research). IFP is developing a process for producing ETBE, whose main advantage is a lower vapor pressure than ethanol in order to bring specifications closer to gasoline. This research has resulted in the construction of 3 TOTAL ETBE manufacturing units in France (global production 200,000 t/year).
¶5. Biodiesel. Esterfip-H is a new biodiesel technology in the production of VOMEs developed by IFP which built a plant in Sete (Herault department). Esterfip-H represents a major biofuels advancement, as it ensures the production of biodiesel meeting European specification EN 14214, and at the same time produces glycerin of high purity in the process. According to IFP presenters, the glycerin by-product is key to overall production economics. The use of biodiesel presents advantages, not only environmental, but also technical. In fact, a study conducted by IFP demonstrates that use of VOME in petroleum-based fuels leads to a significant improvement of the diesel fuel lubricity in engines.
¶6. Synfuels: BTL or "Biomass to Liquid," biofuels are made by first transforming biomass (grain and forest residues, organic wastes, etc.) into gas by high-temperature gasification, then reducing the gas into gas oil by the "Fischer-Tropsch" process. IFP research efforts, notably in partnership with the CEA (Commissariat a l'energie atomique/French Atomic Energy Commission), are designed to improve gasification yields, gas purification and optimization of

the integration of the biomass conversion process and liquid fuel production processes. Also, biomass gasification could pave the way for hydrogen and energy production, according to IFP researchers.
¶7. Hydrogen: For several years, IFP has been developing clean hydrogen production processes to transform hydrocarbonated matter into elemental hydrogen. The two principal sources under study are hydrocarbons and biomass: the OPALE project, based on the gasification by partial oxidation with oxygen from liquid hydrocarbons and the BIOPAC project, that consists in producing hydrogen by steam reforming from "green" ethanol to power a fuel cell, where the ethanol used is obtained from beet or wheat biomass.
¶8. Ultimately, in order to produce hydrogen without releasing CO2, IFP considers it would be necessary to centralize this production into large units, and to capture the CO2 emitted and store it underground. IFP is developing the HyGenSys process designed to produce hydrogen and electricity from natural gas and simultaneously capture CO2 at low costs. IFP is also involved in suggesting solutions to the problem of hydrogen transportation. One of the solutions may consist in using the network of existing gas pipelines, mixing hydrogen with natural gas. These options are being researched within the framework of a European project, named "Naturalhy," in which IFP also participates.

CO2 capture, transport, and storage

¶9. IFP is engaged in researching all aspects of capturing CO2, transporting it, and injecting it underground for storage. It is also studying issues associated with long term monitoring of CO2 stored underground.

¶10. Capture. IFP is investigating the capture of CO2 in flue gases, in particular the optimization of solvents and the way they are used; IFP is researching new methods to implement oxycombustion, in order to obtain flue gases in which CO2 is concentrated and easier

to capture. New options which are being considered involve the direct transfer of oxygen from air by using solid phases undergoing an oxidation-reduction cycle. Finally, IFP is committed to searching for new energy production processes that produce synthesis gas and hydrogen and incorporate the capture of CO2.

¶11. Transport. IFP is studying transport modes and developing methods and tools needed to make this transport safe and reliable. After the capture phase, the CO2 must be conveyed, sometimes over long distances, to a place of storage, such as a saline aquifer. In the current petroleum sector, CO2 is transported in gas pipelines. However, in the supercritical state compression and injection facilities would be required. IFP is developing an alternative solution in which the CO2 is transported and injected underground in the liquid state, at a temperature that remains close to the ambient temperature. According to IFP, transporting and injecting CO2 in liquid form could substantially reduce investment costs in contrast to other methods of CO2 capture currently under research.

¶12. Storage. IFP is also developing modeling tools and laboratory analysis methods to predict the flow of CO2 in the subsoil in the vicinity of the injection well, where the gradients of CO2 concentration, pressure, and temperature are high. Three geological storage modes are being considered: storage in depleted oil and gas fields, in deep saline aquifers, and in un-minable coal seams. IFP's work concerns the analysis, understanding, and modeling of interactions between the injected CO2 and the rocks and fluids of the subsoil. Post-injection geochemical and geophysical monitoring methods are also under study in IFP, in particular seismic and micro-seismic methods, which make it possible to monitor the propagation and evolution of the stored gas and integrity of the overburden of the storage facility.

What kind of collaborator is IFP?

¶13. IFP, through its own research or in partnership with universities, research centers, and industries concerned, is a major player in the field of new energy systems and CO2 capture, transport, and storage. At the national level, IFP works alongside other French research establishments on a number of projects. These include ANR (Agence nationale de la recherche - National Research Agency) and ADEME (Agence de l'environnement et de la maitrise de l'energie - Agency for the Environment and Energy Management). IFP

is also a leader in the European Union and is committed to advancing European research projects, e.g. European CASTOR project(CO2 from CApture to STORage) and European Platform for Zero Emission Power Plants (ZEP). Internationally, IFP has taken part in the Weyburn project, a Canadian CO2 storage project associated with an enhanced oil recovery operation, the scientific accompaniment of which has been coordinated by the International Energy Agency (IEA). IFP is also a leader with China in the COACH project (Cooperation Action With CO2 Capture and Storage China-EU).

¶14. IFP highlighted that it seeks greater climate change-related research collaboration-not only between France and the U.S., but also in EU-U.S. partnerships. Officials underscored that European research funding leaves the door open to American partners. This may prove to be good timing for enhanced EU/U.S. dialogue on energy, sustainable development, and environment as France prepares to assume the EU presidency with environmental issues high on the agenda. At the technical international level, IFP collaborates closely with the U.S., e.g. the DOE-led Carbon Sequestration Leadership Forum (CSLF). IFP was the designated body to organize the 2007 CSLF plenary meeting which took place in Paris.

¶15. IFP clarified its legal status to facilitate future collaboration. IFP senior officials highlighted existing substantial collaboration with the U.S. private sector at the industrial level, and in education/training, particularly graduate training program for engineers (500 students/year, half foreigners, in partnership with the Colorado School of Mines and several U.S. universities). Senior IFP officials consider the recent evolution of IFP's status

to that of a state-owned public scientific establishment under the French EPIC classification (Etablissement Public a caractere Industriel et Commercial/Public Establishment with an Industrial and Commercial Purpose) puts IFP in a position to undertake additional collaboration with U.S. scientific agencies.

¶16. COMMENT: ESTH officers had expected IFP to resemble the American Petroleum Institute. It had not expected a body so committed to research of new fuels and CO2 capture and storage. IFP's executive director is especially keen to collaborate with U.S. scientific agencies such as DOE on fuels for the future and carbon capture and sequestration research. Embassy ESTH officers would be pleased to introduce U.S. agencies to IFP. END COMMENT.

STAPLETON